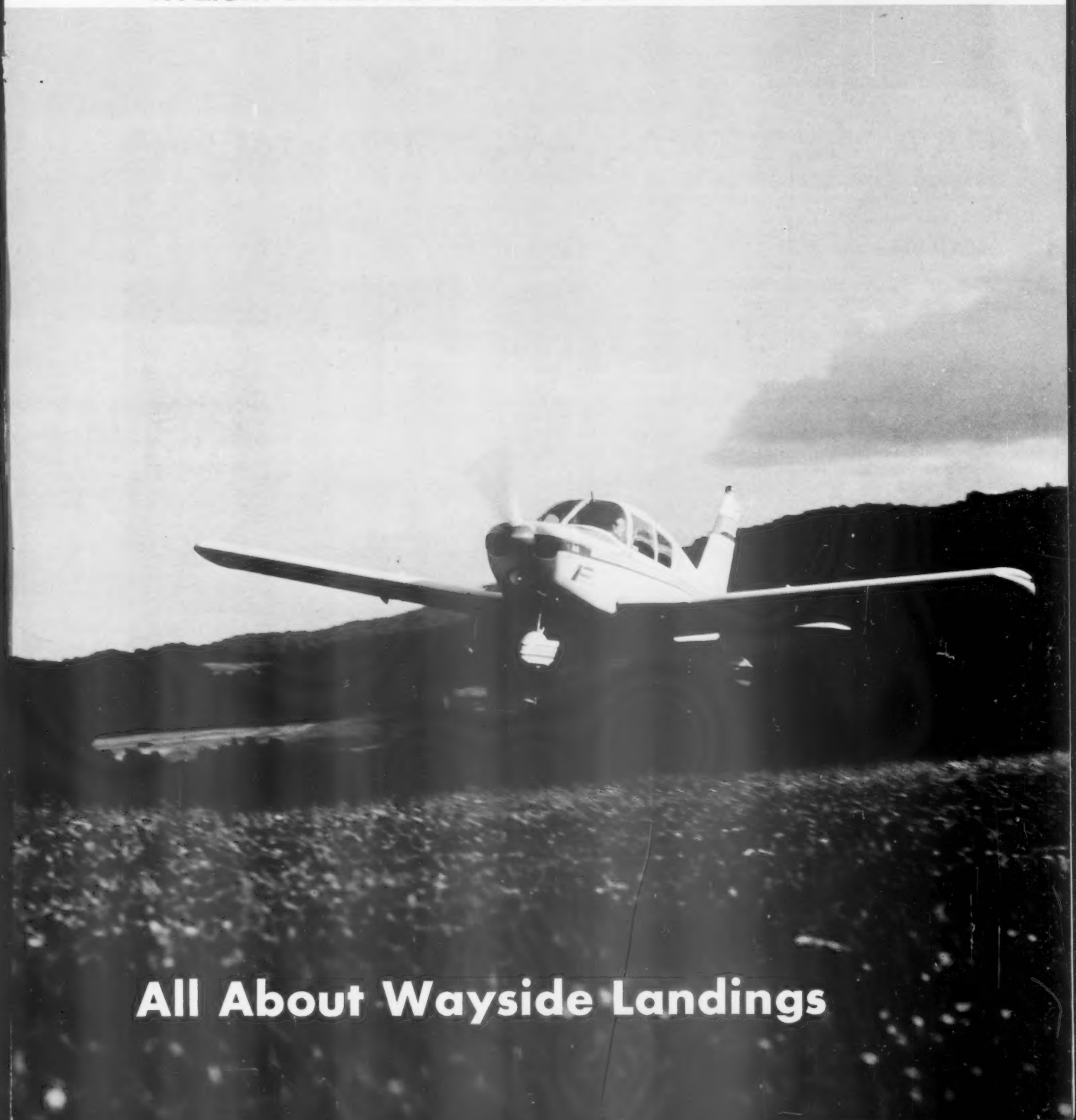
FAA GENERAL AVIATION NEWS

MARCH 1976

A FLIGHT STANDARDS SAFETY PUBLICATION FOR AIRMEN



All About Wayside Landings

COVER:
In the clover.
A farmer's field near
Annapolis makes an
inviting landing spot.

FAA GENERAL AVIATION NEWS

DEPARTMENT OF TRANSPORTATION/FEDERAL AVIATION ADMINISTRATION VOL. 14, NO. 11

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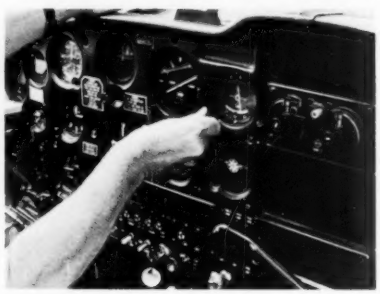

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Grass strips on tiny Lake Erie island serve planes bringing mail in for distinctive "Rattlesnake Island" postmark. Arrow shows caretaker's house. West/East runway is off to right.
Photo by Great Lakes Region

Spring Thaws and April Showers

The condition of unpaved runways at this time of year is a big question mark

One of the main problems with soft landing fields is that you often can not tell from the air how soft or treacherous they are, and by the time you are on the ground it is too late. If you then try to fly your aircraft off the soggy strip in marginal conditions, your flight could have a very unhappy ending, as it did for two young men from Detroit one sunny spring morning last year. Before the day was ended their airplane was on the bottom of Lake Erie and the pilot was dead. Contributing to the tragedy of errors was a wet sod runway on a tiny island in Lake Erie near Port Clinton, Ohio. Details of the flight and the fatal accident were supplied by the passenger who survived.

The airplane was an American *Yankee* owned by a Detroit flying club. The pilot was 20 years old with a private certificate and 127 hours. His passenger, who was a schoolmate at a local college, was not a pilot, but he, like the pilot, had received some training as an airplane mechanic. On this particular April day, en route to school, the two young men made a swing by Detroit City Airport to be sure the *Yankee* was secure; thunderstorms had passed through the area the night before. The plane looked fine. And somehow it seemed too nice a day to spend in a stuffy classroom.

"You want to go flying?"

"Why not."

They departed Detroit City Airport about 8:45 a.m., and turned south. They planned to fly to Put-In-Bay Airport on South Bass Island, about 10 miles north of Port Clinton Ohio, in Lake Erie. They flew south over Detroit to Grosse Isle, then headed out across the water. The entire flight is perhaps 60 miles, the overwater segment 35.

As checkpoints they used Middle Sister Island, "stripe" intersection, and Isle St. George, which they circled and then turned toward Put-in-Bay. Almost there, they spotted the sod runways of "Rattlesnake Island Airport." According to his passenger the pilot was "crazy about grass strips because they were like World War II air strips." They decided to shoot a landing.

The Rattlesnake Island Airport is marked "restricted" and "private" on the sectional chart. There is a north-south runway, 980 feet long, and an east-west strip measuring 1,500 feet. All four ends of the two runways end at the water's edge: *it is a very small island,* not much longer than a quarter of a mile. Not easily apparent from the air was a layer of ground water from one to three inches deep, left over from the storms of the previous night. There was a slight, barely discernible downslope to the south runway, which the pilot had elected to use.

The landing, as described by the passenger, was "smooth at first, but then it began to get bumpy and soggy." The *Yankee* normally will roll less than 500 feet on landing, but a wet sod runway has less than normal friction. With the brakes ineffective the plane slid off the end of the runway and ran onto some rocks at the water's edge where it stopped, with a crunch.

The two men got out, pushed the airplane back onto the runway and inspected the damage. One blade of the prop was slightly bent, as was the lower corner of the cowling. There was a break in the wing tip with fiberglass "sticking up." The pitot tube was bent "out of line about four inches." After running the engine up to full power and noting "minimum" vibration, the pair assessed the damage as "minimum" and decided it was all right to fly. The passenger admitted, "My judgment was prejudiced, because I wanted to leave that island."

Both young men were concerned about the consequences of the unwise landing and wanted to get back to Detroit as soon as possible. Their decision was re-enforced by the appearance of the local caretaker, who told them it was a restricted field and that they should not be there.

The pilot tossed some grass up into the air and decided that the wind was easterly enough to use the west-east runway, which was longer than the one they had landed on and ran the full length of the island. (Another pilot who landed at Rattlesnake half an hour later estimated the wind as from the south variable to southwest at 15 to 20 knots.) The eastern end of the runway has an upslope of about 2 degrees.

For reasons not determined the pilot used partial flaps for this takeoff, although the *Yankee* manual does not recommend flaps for soft field operation. The first takeoff was aborted after a short, splashy run and a second attempt was made from as far back on the threshold of the strip as possible, with the caretaker watching from a seat on his tractor.

According to the passenger's recollection, the aircraft became airborne after using up about two thirds of the runway and was flying about 10 to 15 feet above the surface as it passed over the water. Everything was normal, he thought, except that the airspeed indicator did not work. The caretaker's observation was that the *Yankee* was not actually flying but had merely bounced into the air. At any rate the aircraft dropped into Lake Erie about 100 yards off shore, nosed over and began to sink.

Both occupants managed to open their safety belts and exited the airplane by kicking out the canopy. The pilot shouted for the passenger to get away from the plane—it was going down—and they both began

Tire marks in foreground show where the *Yankee* touched down on arrival, before skidding on rainsoaked surface into rocks.

swimming away.

The caretaker went to their assistance at once, but the only available boat was stranded some 600 feet from the beach. He dragged it into the water and rowed toward the struggling swimmers. Because he had his back turned toward them while he rowed, he did not see the pilot disappear below the surface. When he reached the crash site he found only the passenger, who was swimming weakly on his back in the cold (37 degrees F.) waters of Lake Erie. He got a rope around the young man and towed him to shore. Then he ran to his house to radio the Coast Guard for help. An aircraft was dispatched from Put-in-Bay to pick up the lone survivor and take him to a hospital, where he was treated for exposure and released.

The aircraft was recovered six days after the accident but it was six weeks before the body of the pilot was found. Investigators were not able to determine why the aircraft failed to take off successfully, but there were many possible causes: insufficient thrust from the bent prop, damaged airfoil, bogging down of the wheels, tailwind component, upsloping runway, nervousness in the cockpit as a result of the first accident, lack of airspeed indication, premature rotation, etc. Any one (or all) of these factors could have contributed to the fatal crash. The only certainty is that the pilot did not use proper caution in approaching an unpaved runway at this time of year and became caught up in a situation from which he could not safely extricate himself.

Sod strips may have a romantic appeal for some pilots, but experienced flyers know how treacherous they can be in early spring, when the ground is thawing or soggy from rain. The field that was a breeze to handle last summer and which held up pretty well throughout the fall and winter, can turn suddenly into a nightmarish bog if there has been a warm or wet spell in early spring.

Vertical stabilizer was lost and fuselage damaged when plane flipped over in the lake. Cockpit canopy was kicked out by the passenger in his underwater escape from the aircraft.

Plane was recovered after six days in the lake. Lower blade tip was bent in landing accident.

Sod landing strips are still widely used. Airports without hard surface runways outnumber those with hard surfaces almost two to one—7,281 to 3,943 at last count. Furthermore almost all emergency landings are made on unimproved fields, beaches, roads, levees, etc. Even if you are a pilot who never plans to touch your wheels down on anything but concrete, staying current with your soft field techniques is important. At most airports unusable runways will be marked with a large cross and also NOTAMed with FSS, but wary pilots do not rely entirely on such warnings; the airport management may have neglected to post them, or the airport may be unattended. Perhaps only portions of the runways are soggy or unusable, presenting little difficulty to local flyers but holding unseen hazards for the itinerant pilot who is not familiar with the way the water drains or where it tends to collect. Get what clues you can on runway conditions from UNICOM, if there is one, from the FSS, or from other pilots flying in the area.

There are two essential hazards in landing on a soft, wet or rough field. (1) You may be unable to brake or stop in time and slide off the runway. (2) You may stop abruptly and nose over or cartwheel. Either hazard is minimized by touching down at the lowest possible speed with a nose-high pitch attitude. With tricycle gear the nosewheel should be held clear of the surface as long as possible (with power as needed), and braking should be done with care, to prevent excessive loads on the nose gear. With tailwheel gear, the tailwheel should touch down with or just before the main wheels, and should be held down with the elevators throughout the landing roll.

In general, you will have less trouble putting a tailwheel gear aircraft down on a soft field than one with tricycle gear. You can expect an airplane at maximum gross with a full load of fuel, to be more trouble to set down on a boggy field than one lightly loaded with nearly empty tanks.

If the field is extremely soft (and you have an emergency) you might decide, if you have the option, to land with gear retracted. Caution: some aircraft will take a gear-up landing without serious damage to the airframe, others will not—you have to know about *your* plane. (Maintenance note: After any gear up landing the aircraft must be thoroughly inspected by an authorized person before it is flown, even if there is no apparent damage.)

Unless otherwise recommended by the manufacturer full flaps should be used for soft or rough field landings to permit the softest possible touchdown and a short landing roll. A nose high attitude should be maintained during the roll-out and the flaps retracted, when no longer needed for braking, to prevent damage from mud or slush thrown by the wheels.

The nose-high landing attitude may be a problem for some pilots, because it is difficult to see ahead, and the cleared area may be a very narrow strip. Lining up correctly with the runway on final is important.

Some fields may be much easier to get

Above—spring thaw sets the stage for variably soft fields. Landing strip (running from lower center to upper left) remains partially covered with snow, while dark diagonal stripes crossing the airport indicate uneven thawing over underground utility lines. Below—it is often hard to tell from the air if the strip is soggy; when in doubt, plan to use soft field techniques.

into than to depart. This is likely to be true if there are obstacles at the departure end of the runway—if it slopes uphill—if the threshold is a quagmire—or if the daily thaw is just starting to set in—to name a few obvious examples. Before you commit yourself make sure your departure will not have to wait until the wind changes or summer marches in. Poor field conditions may require a 50 percent increase over normal field length for landing or takeoff—in some cases a 100 percent increase is desirable.

Takeoffs should always be made using *all the available distance*. Runup should be made at a site known to be solid and fairly dry, to avoid bogging down near the threshold; a rolling start may be in order. Look the field over on foot before you leave.

On takeoff the primary hazards are (1) getting airborne prematurely, or (2) failing to get up enough speed to lift off in time. The correct procedure for departing a soft, or rough field or one covered with snow or grass is quite different from taking off from short fields with firm, smooth surfaces. The nosewheel or tailwheel should be lifted clear of the runway as soon as the elevators become effective, and a nosehigh attitude maintained until after liftoff. The object is to transfer weight from the wheels to the wings as quickly as possible, to avoid bogging down, damaging the gear, or sliding out of control.

When the nose-high attitude is maintained throughout the takeoff run, the wings will progressively relieve the wheels of their load and the airplane will lift clear of the surface at an airspeed slower than a safe climb speed, because of *ground effect* (a temporary gain in lift due to compression of the air between the wing and the ground at very low altitudes.) When liftoff occurs, the angle of attack should be reduced gradually with the wheels just clear of the surface until the best rate-of-climb speed is achieved (best angle-of-climb if there are obstacles ahead.) Ground effect disappears at a height roughly comparable to the wingspan of the airplane: pilots who are unfamiliar with the phenomenon of ground effect and forget to ease the nose down after lifting clear of a rough field will find that the aircraft seems to be "losing power." What happens in effect is a loss of lift, which could lead to a stall or sharp drop of altitude unless corrected promptly.

A number of soft field accidents have been attributed to attempts to climb up through the ground effect "layer" before reaching adequate flying speed. For example, last February a low-time private pilot flew a Cessna *Cardinal* with three passengers to a hunt club in the midwest which had a 2,500 foot sod landing field. He had no trouble landing, but by the time he prepared to depart, after a leisurely lunch, the field had softened considerably under a strong sun—so much so that after taxiing to the takeoff end of the runway the pilot shut down the engine and got out to wipe off mud that had been slung up onto the wings and horizontal stabilizer.

He then took off, following recommended procedures for a soft field departure with the *Cardinal*, and lifted off with runway to spare. Shortly after becoming airborne, however, the aircraft apparently stopped flying

Getting the nosewheel mired in the mud is one of the dangers of a soft field landing—a good reason for holding the nose high on landing.

and settled back on the runway. Unable to brake in the mud, and concerned about the rapidly approaching lake at the end of the runway, the pilot deliberately struck a tree with the right wing, spinning the aircraft around and bringing it to a stop. There was considerable damage, but no one was hurt. Investigators for the National Transportation Safety Board found no reason for the apparent power loss, and determined that the probable cause for the accident involved premature liftoff.

The chance that a soft field takeoff will have to be aborted is always a strong possibility. Experienced pilots will usually fix an obvious landmark along the runway as a go/no go decision point. If their wheels are not clear at this point and their speed adequate, they chop the power. All kinds of accidents have occurred because the pilot hesitated too long and hoped for too much.

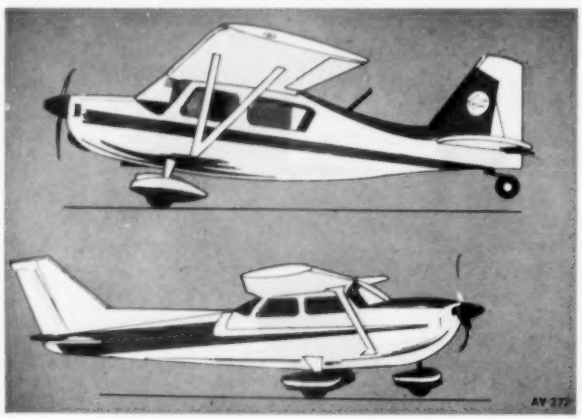
One such accident occurred recently when two pilots in the front seats of an aircraft disagreed over whether to abort or continue the takeoff. They were flying a Grumman *Traveler* out of a 2,600 sod strip at a private airport in northern Illinois. After rolling about 250 feet the pilot who was flying (in the lefthand seat) started to reduce power because he felt that they were not going to get off the ground. The other pilot (more experienced, with an instructor's rating), believing that there was not enough runway left to stop safely, shoved the power back in and took over the controls.

Proper technique for soft field operation is one of three subjects covered by a new film, "Short Field, Soft Field and Crosswind Takeoffs and Landings," produced for use in the FAA Accident Prevention Program. Check with your Flight Standards District Office to learn when it will be shown in your area.

The aircraft struggled up out of the mud but did not quite manage to clear a fence beyond the runway. After the main wheels struck the fence the plane dropped into an adjacent field, resulting in substantial damage but no injuries. It is difficult to second guess as to whose judgment was wiser; but it seems clear that if the pilots had agreed on a deadline for go/no go in advance the accident could have been avoided. NTSB investigators attributed the probable cause to inadequate flight planning.

Sod strips have an undeniably adventuresome appeal for some pilots, who find it hard to resist the temptation to set down in an inviting meadow on a remote mountain top or on an uninhabited island. During most of the year sod will give you little trouble, but March and April is the season to be wary. Unless you are in the mood for an unscheduled vacation, look it over carefully before you leap to a conclusion to go down.

Top—Pausing on soft ground to run up the engine can result in an unplanned stopover. Expect boggy conditions at this time of year, and keep rolling once you head for the threshold. Below—Tailwheels should be raised early in the takeoff roll. Nosewheel load should be lightened with back pressure.



Top—The object is to get the plane airborne as soon as possible. Caution: some types of airplanes can be stalled on the ground. Below—nose-high attitude at liftoff must be modified promptly to build up airspeed and prevent stalling after leaving the ground effect which extends up only a few feet.

FARs

STATUS of the FEDERAL AVIATION REGULATIONS

(As of March 1, 1976)

The Federal Aviation Regulations, formerly published only in volumes, have been re-issued as individual Parts. Infrequently amended Parts are sold as single-sale items, while frequently amended Parts are sold on subscription. Subscribers to volumes were notified of prices and ordering procedures for the new Parts by the Superintendent of Documents as their volume subscriptions expired.

The number in parentheses after each Part indicates the latest change, if any, to that Part, which is sent out gratis to the subscriber. Changes to single-sale items are sold separately. FARs may be purchased only from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

FAA SEPARATE PARTS	TITLE	PRICE
Parts sold by subscription		+ foreign mailing
Part 1	Definitions and Abbreviations (2)	$3.00 + 75c
Part 21	Certification Procedures for Products and Part (4)	$3.75 + 95c
Part 23	Airworthiness Standards: Normal, Utility and Acrobatic Category Airplanes (2)	$3.55 + 90c
Part 25	Airworthiness Standards: Transport Category Airplanes (2)	$6.60 + $1.65
Part 33	Airworthiness Standards: Aircraft Engines (1)	$3.00 + 75c
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Part 37	Technical Standard Order Authorizations (2)	$5.65 + $1.45
Part 63	Certification: Flight Crewmembers Other Than Pilots (1)	$3.00 + 75c
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NOTICE

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* Changes to individual airspace designations and airways descriptions, individual restricted areas and individual jet route descriptions are not included in the basic Parts 71, 73 and 75, respectively, because of their length and complexity. Such changes are published in the Federal Register and are included on appropriate aeronautical charts.

** Due to the complexity, length, and frequency of issuance, airworthiness directives, en route IFR altitudes and standard instrument approach procedures are published in the Federal Register and are not included in basic Parts 39, 95, and 97. In addition, en route IFR altitudes and instrument approach procedures are depicted on aeronautical charts.

Standard instrument approach procedures are published in the Federal Register by reference to FAA documents which are available for examination at the Rules Docket (AGC-24) and the National Flight Data Center, in FAA Headquarters, Washington, D.C. and at FAA regional offices and Flight Inspection District Offices.

Above—visual checks often (not always) reveal dirt, bug or ice in pitot. Below—best protection for pitots is a secure cover between flights. Red flag alerts pilot it is there.

Attitude Flying

Controlling the aircraft without airspeed indication

The light trainer had just lifted off the ground when the student pilot, scanning the panel quickly as he had been instructed, observed that the airspeed indicator needle had not moved into the arc. He tapped the window several times, but the needle did not move, and as he pondered the matter the remaining runway diminished rapidly. Finally in a near-panic he cut the power. The aircraft bounced heavily onto the runway, and as the pilot braked heavily to avoid overrunning he spun around in a ground-loop that ended on the grass with damaged landing gear, bent prop and wingtip. A telltale red streamer pointed to the source of the problem: a pitot cover that had not been removed.

The pilot was not seriously injured, but he had the scare of his life. In the investigation that followed he stated that he had aborted the takeoff, even though he realized there was insufficient runway remaining, because he did not see how he could fly or land the airplane without an airspeed indicator. Adequate primary flight instruction should prepare the pilot to handle this kind of instrument failure.

Since most taxiing in small aircraft is done at speeds which are below the indicator arc, the first sign of trouble with the indicator usually appears during takeoff or climbout. It is always a good idea to glance at the airspeed indicator early in the takeoff run, while there is still time to abort. If the ram air opening alone is plugged, you may simply get no reading at all—as in the example above. If the drain hole is also blocked you may get readings which are related to the change in altitude instead of the airspeed. It suffices to say that whenever the airspeed indication does not appear normal to the condition of flight, you should suspect some malfunction of the pitot tube system.

In this situation the proper procedure is land the aircraft as soon as it may safely be done, but there is no reason for panic. In the absence of airspeed data, the aircraft can be controlled safely by coordinating power settings to pitch angle, as determined by reference to the horizon or to the artificial horizon instrument. This type of "attitude flying" requires practice and instruction.

The first thing you need to do is to learn the power settings required to keep your airplane at level flight at cruise speed. The figures are usually given in your owner's handbook, but you should also check them out in actual flight conditions, since individual aircraft performances do vary. With the aircraft trimmed for level flight, note carefully the angle between the nose and the horizon, or where the horizon cuts across the windshield. With practice you can learn to establish this configuration without reference to the airspeed indicator, with no significant variation in airspeed.

Next, check the horizon during a normal climbout and during a "best rate" climb. Practice until you can achieve these attitudes without watching the airspeed.

Finally, determine the power setting needed for a normal approach to land, and the associated pitch angle to the horizon. Shoot a number of approaches using only these two sources of information, with another pilot or instructor monitoring the airspeed, until you feel confident while making your approach in this manner. (All pilots should have become familiar with the feel of an approach to a stall when checking out in an unfamiliar aircraft.)

Keep the power settings memorized or written down where you can always have access to them when you fly. Granted, actual airplane performance will vary somewhat with temperature, loading, altitude, etc. but the variance will be quite tolerable for emergency use.

Pitch angle is something you have to memorize. There are pilots who like to mark horizon positions on the windshield, but that does you little good when you change airplanes. For IFR flight without airspeed indication, the procedure is the same, except that you must rely on the artificial horizon instru-

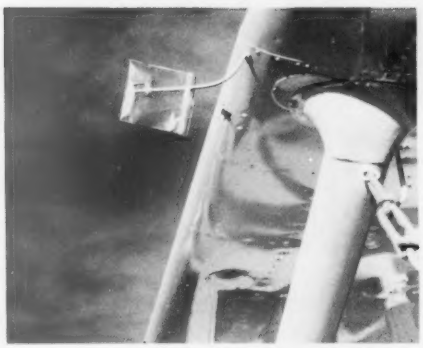
Above—one way to practice "attitude flying" is with folded card taped to conceal airspeed from pilot, but not from safety pilot. Below—pitots are found in many shapes and places.

ment instead of the natural horizon, to establish the attitude of the aircraft. This kind of procedure should be practiced under the hood, *in the presence of an instructor or another qualified pilot.*

For all pilots, VFR or IFR, it is a good idea to stay continually aware of the pitch angle of the airplane, and to be alert to any changes from the normal angle for a given flight condition. Pitch angle is not as exact a source of information as a normally functioning airspeed indicator, but on the other hand it cannot be put out of kilter by a frozen drop of rain.

Icing is probably the most common cause of pitot tube blockage—and one of the most difficult to trace, since by the time investigators arrive at the crash site, any suspected ice may have melted. But the small openings in the pitot tube head may also become stopped up with mud, debris (from the prop blast of other aircraft running up), or even insects. (A pitot cover is a must between flights.) A case in point recently involved a California pilot who was ferrying a *Comanche* to a nearby airport for an annual inspection. The pilot described his experience with wry humor:

"About noon I preflighted my aircraft and found everything in order. Called Fresno for weather at San Jose area; it was expected to be clear. Runup was normal and everything in order, so I proceeded to take off. The takeoff was normal and I raised the gear



Pitot covers can be bought, made to order—or improvised, as above. Two rules for use: they must stay securely in place, and their presence must be obvious to preflighters.

—but when I looked at my instruments I saw my indicated airspeed exceeded 200 mph. That was definitely not normal!

"Since I was still close to the airport I stayed in the traffic pattern and made an approach to land. In my anxiety to get down and in my apprehension about not having proper instruments—plus the anxiety that something else might fail—I neglected to let my gear down. I did make the smoothest landing of my life—except for all the grinding noise!"

Investigators found that the aircraft pitot tube was stopped up by an insect known as the "leaf roller," which had deposited its eggs in the tube and sealed it up for safekeeping. A snug little nest—while it lasted.

A thorough preflight inspection will often (not always) reveal pitot blockage. However, you should never poke any hard object into the opening or attempt to clear it by blowing into it. If you suspect blockage, seek assistance from a mechanic.

One type of pitot head has a small metal hinged flap designed to be opened by wind pressure. Occasionally the flap will rust closed, if it is not checked regularly on the preflight inspection.

And of course, the removable pitot tube head coverings which are inadvertently left in place or missed during the pre-flight check cause their share of trouble.

Since the pitot tube head is usually mounted underneath the wing, or near the nose cone in some multi-engine aircraft, it is vulnerable to damage from careless ground handling; or from rough landings, especially on soft strips. By and large the pitot system is a thoroughly reliable source of airspeed indication, but it does fail occasionally. When it does, the only backup you have is your competency in attitude flying.

(*Editor's note: This is the second of a two-part series on pitot tube systems, airspeed indication and attitude flying. The first article, "The Impossible Climb," in the February 1976 issue of this magazine, described a fatal B-727 accident and explained the pitot mechanism functions.*)

Famous
FLYERS

The Big Flap

One of the most effective safety devices on the modern light airplane is the simple flap, a hinged section of the trailing edge of the wing operated either mechanically or electrically and used to increase the lift and drag ratio of the wing during takeoff and landing. Oddly enough, the flap made its appearance rather late in the history of airplane development, in 1916, and only then because of the stubbornness of one particular aircraft designer whose name is virtually unknown in American general aviation circles today: Sir Richard Fairey.

Charles Richard Fairey was an Englishman cast out of the traditional mold that has produced such indomitable individualists as Winston Churchill. Born on May 5, 1887, near London, he was reared in the genteel manner proper to a wealthy Victorian family. But he was scarcely into his teens when his father died and left a legacy of debts that amounted to virtual bankruptcy. Young Charles Richard was taken in hand by a stern country squire of an uncle and destined for the farming life.

But the boy had ideas of his own. Sensing that his was to be an age of tremendous industrial accomplishment, he ran back to the city and applied himself to technical studies, earning a degree in electrical engineering at a night school while working full time during the day as an apprentice lamp maker.

The degree enabled him to ascend to a position of responsibility with the firm at age 18, but what he himself called "a swollen head" led to his being dismissed from the job. He promptly shifted his field to analytical chemistry, found a position with the Urban Council, and supplemented his income with teaching engineering courses in his spare time. Despite his youth he was an imposing figure—six foot six and well over 260 lbs., with a commanding eye, a strong nose, heavy jaw, and an unflagging self-confidence. He seemed to be waiting only for the right opportunity to astound the world with his abilities.

Opportunity came his way in 1907 when he entered and won first prize in a model airplane competition. The "Fairey Monoplane," which flew 480 feet, was interesting enough to induce a London department store to pay the builder a generous sum for the right to reproduce it. Fairey was now launched on what was to be his lifelong career. His next effort was a full-sized monoplane that never actually got off the ground, but drew the attention of the Blair Atholl Construction Company, which hired him as a manager of their aircraft manufacturing plant on the Isle of Sheppy. There, at what became known as the cradle of British aviation, he rubbed elbows with the foremost designers of his day, learned to fly, and dreamed of founding his own company.

Sir Richard Fairey (right) built the *Hamble Baby* in 1916. *Baby* was the first production aircraft with wing flaps functioning separately from ailerons. Note cables which worked upper and lower flaps in unison.

He still had no capital to speak of, so in 1913 he jointed the firm of Horace and Oswald Short, brilliant aeronautical designers who were soon turning out aircraft in quantity for the British military forces, as World War I broke out. Fairey tried to join the Royal Naval Air Service, but was persuaded to remain a civilian designer with the promise that means would be found for him to build aircraft on his own. This was accomplished by dint of a subcontracting arrangement with the Short brothers, which launched the Fairey Aviation Company into existence in 1915 with an order for six seaplanes.

Now at age 28 Fairey was finally his own master and in a position to show his mettle. The adaptation of aircraft to military purposes, as the first World War spread over Europe, saw an increasing emphasis on high speed, low drag designs; but such aircraft were having difficulty operating out of the short airstrips available to them near the battlefields. Seaplanes were also experiencing difficulty taking off from the water when wind or surface conditions were not conducive to getting the plane up "on the step" prior to lift off.

While other plane builders worked at the problem by experimenting with increased horsepower, which tended to reduce payload, or with larger pontoons, which reduced maximum airspeed, Fairey characteristically went his own way and came up with a totally different solution. In 1916 Fairey aircraft were fitted with what the inventor described as:

". . . improved means for controlling the camber of the planes of an aeroplane, the object being to enable the cambers of both wings to be altered simultaneously in the same direction at will . . . or in reverse

Fairey *Delta II* (above) was the first aircraft to fly faster than 1,000 mph. The Fairey *Flycatcher* (left) used huge flaps to operate from battleship gundecks.

directions . . . The alteration may be affected throughout the whole length of the wing, so that any change will produce an alteration in both the camber and the angle of incidence. . . ."

Fairey's invention was by no means a new idea. Designs for changing the camber of a wing in flight by an "aileron," or movable wing section were patented in England as far back as 1868 (Boulton), long before the first successful airplane flight. But the early designs were for the purpose of establishing lateral control of the aircraft, by increasing lift at one end of the wing and reducing it at the other. Fairey was the first to build movable trailing edges to function in unison (for increasing lift) and independently from the ailerons. Originally the Fairey flap was controlled by a handwheel and cables. Later gear-driven shafts replaced the cables.

The new wing flap gave Fairey aircraft an immediate advantage in combat operations, and soon the young manufacturer was turning out dozens of airplanes a month for British military services. Fairey aircraft were widely used by the Allies in World War I, and earned a reputation for their anti-stall characteristics and for ease of handling on takeoff and landing—even though they never acquired the glamor of such "killer" aircraft as the *Camel* and the *Spad*.

At the war's end, when other aircraft manufacturers disappeared from the scene, Fairey Aviation continued to thrive, mainly on military orders. In 1923 Fairey produced the *Flycatcher*, the first aircraft to operate from battleships (not carriers), using platforms over the large gun turrets. Here again the flap gave the aircraft the necessary STOL characteristics for this kind of operation.

As biplanes gave way to monoplanes in the 1920's, and the reduced wing area led to stall problems at low speeds, the usefulness of flaps became generally recognized, especially for military aircraft and racers, and also for commercial air carriers. Other British designers, like Sir Frederick Handley Page, came into the picture with the invention of the slotted wing. It was found that a slot between the flap and the wing affected the flow of the air over the wing favorably, producing as much as a 300 percent increase of aerofoil lift.

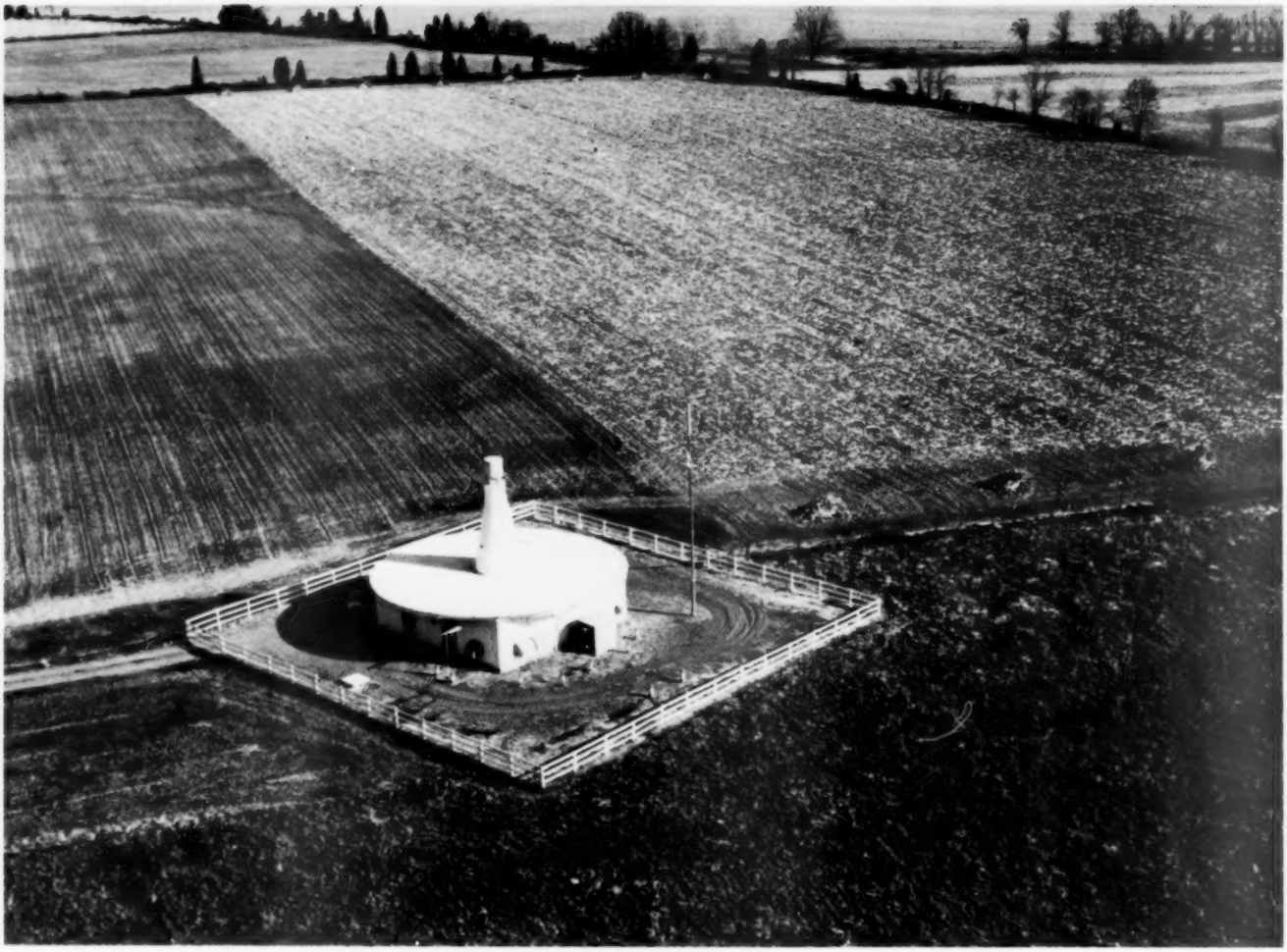
The next variation of the flap was produced in 1920 by Orville Wright, working with J.M.H. Jacobs on the problem of air "burbling" over the wing. They invented the *split flap*—a hinged section of the underside of the wing which, when lowered, did not affect the configuration of the upper side. Split flaps, offering a large increase in drag as well as lift, enabled highspeed aircraft to steepen their approach and land without excessive speed.

Another American, Harlan Fowler, working with U.S. Army Air Corps, perfected a still more effective flap by combining two existing concepts—the slotted flap and the *Junkers* "auxiliary wing." Fowler designed a small aerofoil to be housed in the trailing edge of the wing, capable of being extended backward and down, with a slot, or gap, between it and the body of the wing.

The Fowler flap was followed by the Pegna *double-slotted flap*, used by Douglas on his large transports in the 1940's, and later by the Boeing *triple slotted flap* (including a slotted flap on the leading edge of the wing), used effectively on jet air carriers such as the B-727. By the close of World War II, in one form or another the flap had become standard equipment on virtually all aircraft, including the rapidly expanding fleet of light aircraft for general aviation. The reduction in stall speed made possible by the simple flap used in light trainers has made it easy for thousands upon thousands of student pilots to learn how to land an aircraft and to fly at slow speeds without danger of stalling.

The Fairey Aviation Company, in the meantime, prospered, and Fairey grew rich and famous as one of the dominating figures of World War II, when his aircraft helped to turn the tide of battle against the Germans (a Fairey *Swordfish* torpedo bomber crippled the *Bismarck* in 1941). He was knighted as Sir Richard Fairey after the war for his leadership of the British Air Commission to the United States, and although weakened by illness from the strain of the war years he continued to challenge new frontiers in aviation, urging his colleagues not to slacken their efforts to dominate the air in the jet age. On October 3, 1956, his *Delta II* jet snatched the world airspeed record away from North American's F-100C *Super Sabre* with an incredible mark of 1,132 mph—the first aircraft to fly more than 1,000 mph.

Seven months later Sir Richard Fairey was dead of a heart attack. His name is virtually unknown to pilots who are unaware of the invigorating Elizabethan spirit he breathed into the aircraft industry at crucial points in its history, and who have no idea of his role in designing what is certainly one of the most useful and safety-enhancing devices ever created for airplanes—the flap. ■



Checking Your VOR

Assume that you last made a check of your VOR receiver eleven days ago. Since that time the aircraft has flown six hours.

(1) Can you legally take off on an IFR flight before checking your VOR system?

(2) Could you take off on an IFR flight when the weather is VFR if you check your receiver by a ground point after becoming airborne?

The answer to both these questions is NO.

Federal Aviation Regulation 91.25 states that no person may operate an aircraft under instrument flight rules (using VOR) unless the VOR equipment of that aircraft has been checked within the preceding ten hours of flight time *and* within ten days before the flight, and found to be within permissable tolerances. (If the VOR equipment is maintained, checked and inspected under an approved procedure by an authorized repair facility, as might be the case in air carrier or other commercial operations, the pilot check is not necessary.)

The regulations require periodic VOR checks only for IFR operations—this means flight under instrument flight rules, not necessarily in instrument weather conditions. However, VFR pilots are also well-advised to check the accuracy of VOR receivers regularly. An error of only a few degrees on the VOR receiver can result in a surprisingly large navigation misguidance. If your equipment is ten degrees off, by the time you have flown 50 miles out from a VOR station you may be as much as eight miles off course.

How can you check your VOR receiver?

The most accurate test for a pilot to use is the VOT (VHF Omnitest Equipment) specifically designed for the purpose. Many large airports have VOTs. To find if there is a VOT at a given location, check the listing for that airport in Airman's Information Manual (AIM) Part 3; the VOT frequency will appear under "Remarks". The VOT is a low-powered VOR station which transmits a "O" degree VOR course in all directions. (Thus the VOT check can be made nearly anywhere on the ground at the airport.)

When you tune in the VOT frequency you should get the same indication as you would for any VOR if you were on the "O" radial. If you set the Omnibearing Selector on "O" your needle should center and the To/From indicator should read "From". (If the needle reads 003 or 357 you have a 3-degree error.) Now set the selector to 180; the needle should center with a "To" reading. Note that VOT equipment is designed for ground use and is not recommended for airborne checks.

If no VOT is available, the next best thing is a VOR signal on the ground, at a designated VOR ground check point. These points are located on many airports across the country; locations are listed in a special section in AIM Part 3. To use this type of VOR check it is necessary that your airplane be positioned in a precise spot on the airport; this spot will usually be clearly marked on the ground along with the radials to use for "to" and "from" readings.

If you have dual VORs you can also check your receivers one against the other, in the air—or on the ground if a VOR signal can be received. With any ground check you must have no more than a four degree error (either to or from) for IFR flight. The same is true of the dual-VOR check in the air.

When none of the above methods are available you can check your VOR receivers in the air by using a designated airborne checkpoint (these are also listed in AIM Part 3) or by devising one of your own. To do this, locate on a chart a prominent landmark that lies on a VOR airway 20 miles or more from the station, then fly over it with your selector set to the indicated radial. With these airborne checks the allowable error is six degrees. (The extra margin of error is allowed because of the difficulty of positioning your aircraft directly over a ground point.) *Any airborne VOR check should be made during a VFR flight.*

The result of the VOR check (including date, place, degree of error, and signature of person making the check) must be entered in some permanent record. Some pilots keep a special notebook for this purpose; others use a section of the aircraft logs or their own pilot logbook. The point is to have it handy the next time you want to make an IFR flight, to be sure your VOR accuracy check has not expired. ■

Ground checks using standard VOR signals (unlike the VOT check) must be made at a precise spot on the airport.

BRIEFS

CASTLES IN THE SKY. Anyone who plans to construct a building, tower, wires or any other structure that might affect the "navigable airspace" is required to notify FAA 30 days in advance. Affected are builders of objects more than 200 feet high (or less if in proximity of an airport). Notice is required to allow FAA to advise the flying public and to take any other steps considered necessary to protect persons in the air and on the ground. Advisory Circular 70/7460-2F, "Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace," gives complete information.

ALL ABOUT NOTAMS. The national Notice to Airmen (NOTAM) System is designed for quick dissemination of information that could affect air safety but which is not known sufficiently in advance to publicize by normal means, such as on charts, in AIM, etc. NOTAMS usually involve unanticipated or "temporary" conditions or hazards in the aviation system. Effectiveness of the NOTAM system is dependent in large part on the cooperation and participation of the aviation public. Any situation or condition that could affect air safety should be reported to FAA personnel. (Although Flight Service Stations serve as a "clearing house" for NOTAMS, any FAA facility will forward the information.) A new FAA Advisory Circular, "National Notice to Airmen System'' (AC-210-1A), gives complete information on the NOTAM system.

CONTROL SURFACE FLUTTER is believed to have been a factor in a number of accidents when a coating of ice formed on a control surface. Flutter can be set up by a surprisingly small accumulation of ice, snow, mud or other substance causing imbalance of the control surfaces. Pilots should never take off with anything coating the tail surfaces or ailerons, and should also guard against water collecting inside these surfaces (because of plugged drains). If control flutter does occur in the flight, the aircraft should be landed as soon as possible. Reducing power and speed may minimize the problem; however, an airspeed low enough to stop flutter may be at or near the stall speed, and control vibration may disguise the onset of stall conditions. Advisory Circular 20-93, "Flutter Due To Ice Or Foreign Substance On Or In Aircraft Control Surfaces," discusses the subject further.

CANUCK MECHANICS. Pilots who will be winging their way north to Canada this summer will be interested in a new FAA Advisory Circular, "Mechanical Work Performed On U.S. And Canadian Registered Aircraft." AC 43-10 explains regulations that apply in each country and lists the ratings and certificates necessary to qualify the mechanic to perform various types of service. The circular also contains guidelines for Canadian engines to be overhauled by U.S. repair agencies.

Advisory Circulars mentioned in this column are available free from DOT/FAA Distribution Unit, TAD 443.1, Washington, D.C. 20590.

ATMOSAT. "America," a ten meter (33-foot) experimental superpressure balloon was launched from Rancho Palos Verdes, Calif., on a test flight which covered 500 miles in 30 hours, coming down near the Arizona/Mexico border. The "Atmospheric Satellite" was a forerunner of an experiment planned for later this decade in which similar unmanned balloons will rise 60,000 feet with one -ton payloads of test equipment (including an ozone sensor) to measure the composition and motion of the atmosphere, and to monitor pollution.

Instructor Clinics to be Conducted by Industry Groups

Under a new FAA program, industry groups will be allowed to conduct flight instructor refresher clinics that will qualify attendees for renewal of their certified flight instructor (CFI) certificates.

The first industry group to be approved to conduct instructor refresher clinics is the National Association of Flight Instructors, with a first clinic scheduled for May 1976. Approval of other groups is expected to follow soon. To gain FAA approval it is necessary for the industry group to submit an acceptable training course outline.

The clinic concept of recurrent training for flight instructors was begun by FAA in the 1960's to increase standardization in flight instruction and to improve the safety record of instructional flying. In the past decade teams from the Flight Instructor Refresher Unit of the FAA Academy in Oklahoma City have toured the nation annually, conducting many hundreds of clinics.

Several factors were considered in making the decision to transfer the conduct of the clinics from FAA to industry, including increased demands for the training; limitations on FAA budget and personnel, and the improved capability of industry to take on such responsibility. The complete changeover will be phased in during approximately the next one and one half years.

"Flying Crane" Hearings Held

Two public hearings have been scheduled by FAA on proposed rule changes governing helicopter "flying crane" operations, and the deadline for comments on the proposal (75-38) has been extended until April 8, 1976.

The proposal would permit restricted category helicopter to carry external loads on a commercial basis provided they meet the specified safety requirements. Restricted category helicopters, which included many surplus military helicopters, are now limited to special-purpose operations, such as aerial application work and pipeline patrol.

Send comments on the proposed rule changes to the Office of the Chief Counsel, AGC-24, FAA, Washington, D.C. 20591, Attention: Presiding Officer, Public Hearing on Notice 75-38.

Mechanics to Meet in Nashville

General aviation mechanics in the eastern United States, gathering at Nashville, Tenn., for the 10th annual Mid-South General Aviation Maintenance Seminar, March 30 through April 1, will be briefed by manufacturers on the latest approved procedures for specific repair problems.

Attendees will also hear a review from Ed Morey, assistant chief of FAA's Flight Standards General Aviation Division, on soon-to-be-published notices of proposed rule changes to the Federal Aviation Regulations affecting maintenance work. These include a change to Part 91.29 which would enable the pilot to rely on the judgment of a qualified mechanic concerning the airworthiness of an aircraft as it relates to work performed or supervised by that mechanic.

Other significant proposals to be reviewed include a rewording of FAR Part 91.52 to allow all models of four-engine aircraft and three-engine turbine-powered aircraft to be ferried for repairs with one engine out; a change to Part 145.54 that would extend the privileges of continuous inspection programs to repair stations; a change to Part 91.173 that would require more extensive record keeping with regard to AD compliances; and a change to Part 91.52 requiring a written record of ELT battery replacement or recharging.

ELT Data Is Consolidated

Four earlier FAA Advisory circulars covering Emergency Locator Transmitter Operations and Maintenance have recently been combined into one circular. The new AC includes definitions, types of ELTs, information on installation, maintenance guidelines, operation and testing. ELTs are required in most general aviation aircraft.

The new AC 91-44, "Emergency Locator Transmitters Operational and Maintenance Practices," is available free from DOT/FAA Distribution Unit, TAD 443.1, Washington, D.C. 20591.

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• Ford Trimotors

I am doing a story about the Ford *Trimotor* airplane. How many of these are still flying? I understand #N7584 is currently operated as a commercial carrier by Island Airlines of Port Clinton, Ohio, and they say theirs is the last of these planes in commercial service in the U.S. Can you confirm this statement? If there are others in commercial service in the U.S., where and by whom? Thanks.

Jan S. Paul
Bakersfield, Calif.

The Aircraft Registration Branch of FAA's Aeronautical Center indicates that seven such aircraft are currently registered. In addition to the N7584 you mention, N8407 is in the process of rebuilding at the Experimental Aircraft (EAA) museum at Hales Corner, Wisc., and N9683 is in the Smithsonian Air and Space Museum in Washington, D.C.

Four others are registered to individuals: N4144, N6077C, N9645 and N9651. We are not aware that any of these are being used in scheduled commercial service. You may be interested to know that a book on the Trimotor *has been written by George Hardie, Jr. You can contact him at EAA, P.O. Box 229, Hales Corners, Wisc. 53130*

• Address for comments

I have been a subscriber for some years and I am quite pleased with the contents of your magazine—especially the Flight Forum. I suggest that more people might write if they knew exactly where letters should be sent. Therefore, in the tinted block where you indicate your welcome of comments you might also carry the address for responses.

Ted Cone
New York

Consider it done.

• On the Disappearance of 80 Octane

I'm not one for writing, but I feel this is extremely important. A few weeks ago I went to the airport and found 80 octane is gone for good. I have also read the article in your November issue entitled, "Low Compression Engines and High Grade Fuel." I can't believe that the super-safety FAA would let this happen! No mention was made of the possibility of engine failure on the engines involved. I am part owner in a used Cessna 150; a new 1976 model costs about $15-$16,000. Engine overhaul is about $2,300. I hope you make a running report of this problem in FAA GENERAL AVIATION NEWS.

Arthur R. Johann
Glendale, N.Y.

FAA is presently conducting an extensive field investigation to determine to what extent maintenance needs increase, if any, with the use of Grade 100 LL fuel in engines designed to use Grade 80 fuel. We will keep you posted as soon as information is available. A slide film show discussing proper use of contemporary fuels is being prepared by FAA.

• Pilots and Heart Disease

In your January issue a Brief states, "Certain Recommendations from the American College of Cardiology concerning the certifications of pilots affected by heart disease are under study by the Federal Air Surgeon." The recommendations referred to are contained in the report of the Eighth Bethesda Conference of the American College of Cardiology, supported in part under contract from the FAA. As Chairman of the Conference Committee I would like to point out that the front sheet of the report states "The recommendations . . . are those of the Conference participants and do not necessarily reflect the official position of the American College of Cardiology." Some of the 75 conference participants were members of the American College of Cardiology, but many were not.

Arthur C. Beall, Jr., MD
Houston, Texas

• The Jess Harris Story

We have read the Jess Harris/Elko story in your January issue. Needless to say the story is an excellent one. Hopefully, the message that is conveyed will be heeded by anyone tempted to out-best Ol'Mother Nature!

Jess feels the same way. He says, "Hope it will help to make someone give the situation a second thought."

Mrs. Jess C. Harris
Elko, Nevada

• Doolittle's Triple Crown

In your article on Jimmy Doolittle in the January issue you neglected to mention that Jimmy Doolittle is the ONLY pilot to have won first place honors in *both* the Thompson Trophy (closed course) race as well as the Bendix (transcontinental) race in the 1930's. These, in addition to winning the Schneider Trophy once, as you mentioned.

Jack Wichels
Lynnwood, Wash.

• Up with Ruark

The January issue of FAA AVNEWS is splendid. Your editor saw that Ruark's Old Man was teaching the Boy that necessary symbiosis between man and more-than-machine. Without the symbiosis all our training manuals and simulators go for naught. Both Doolittle and Harris understand that. Harris ignored it once. Your three articles add up to didactic literature. Congratulations.

R. G. Wilson
Wichita, Kansas

• Down with Ruark

I write to express my strong protest at inclusion in the January 1976 issue of an excerpt from the writings of Robert Ruark—"As the Twig is Bent."

The implied association of the aviation community with this type of hunter—whose contribution was the merciless and contemptible butchery of helpless and irreplaceable wild creatures—is offensive and intolerable.

It would be appropriate if your next issue would carry on the Frontispiece the words of Joseph Wood Krutch: "When a man wantonly destroys the works of man he is called a vandal; When he wantonly destroys the works of God he is called a sportsman."

Cyril Toker, MD
Scarsdale, N.Y.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-807, Washington, D.C. 20591.

• Brakes in an NY-2?

In the Doolittle article in January 1976 you state, "he released the brake." In a NY-2? In over 1,000 hours in NY's I never saw one with brakes. Also I've landed on many grass fields but never a "grass runway!"

I enjoy your magazine.

Col. Paul Young
Key Largo, Fla.

INSTRUMENT CORNER

• Who Needs VOR?

If VOR facilities are used as part of an NDB missed approach procedure, is VOR equipment legally required to fly the approach? If so, what useful purpose do these NDB procedures serve where VOR procedures at the same airport provide lower or equal minimums? When was the last time, for instance, that anyone asked for an NDB approach to O'Hare?

James M. Thoburn
Rochester, N.Y.

VOR equipment is required to fly an NDB approach procedure which uses VOR facilities as part of an NDB missed approach. This is also true when an intermediate or final fix of a NDB procedure must be identified by a VOR radial.

Many NDB procedures do provide useful service even though VOR procedures at the same airport provide lower or equal minimums. Often, an NDB approach provides the only straight-in approach to an ILS Runway, when the ILS is out-of-service. This provides for a higher aircraft acceptance rate during weather conditions which require landing on a specific runway.

• Cleared for the Option

Recently at a large controlled airport I heard a pilot ask to be "cleared for the option." Is that some kind of instrument approach?

Name withheld
St. Louis, Mo.

When conditions permit controllers will, upon request, issue a "cleared for the option" clearance. This procedure, used mainly by instructors, allows a choice of touch-and-go, low approach, missed approach, stop-and-go, or full stop landing. It can be a valuable training tool since the trainee does not know in advance which maneuver he will be expected to accomplish. In instrument training an option clearance provides realistic "missed approach" experience. Request for the option approach procedure should be made when passing the final approach fix inbound on an instrument approach; if used in VFR training the request should be made when entering downwind. The option approach is only available at tower controlled airports.

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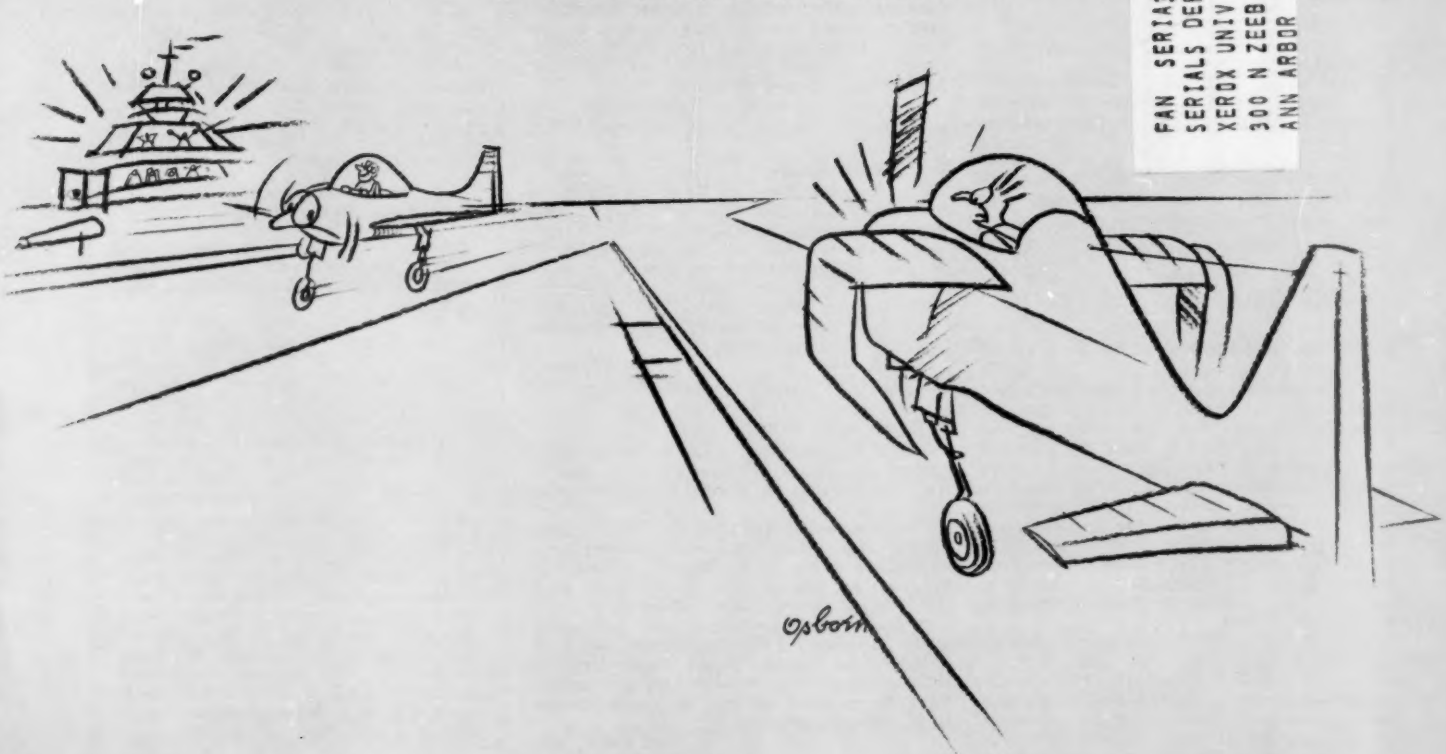

Opposing takeoffs can cause a shock.

Idea suggested by Thom Hook,
FAA, Headquarters, Washington, D.C.